



US007261961B2

(12) **United States Patent**
Kamachi et al.

(10) **Patent No.:** US 7,261,961 B2
(45) **Date of Patent:** Aug. 28, 2007

(54) **THERMOELECTRIC CONVERSION APPARATUS**(75) Inventors: **Atsushi Kamachi**, Utsunomiya (JP); **Hitoshi Okanobori**, Utsunomiya (JP); **Shunsuke Itami**, Saitama (JP)(73) Assignee: **Honda Motor Co., Ltd.**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 563 days.

(21) Appl. No.: **10/807,723**(22) Filed: **Mar. 23, 2004**(65) **Prior Publication Data**

US 2004/0191592 A1 Sep. 30, 2004

(30) **Foreign Application Priority Data**

Mar. 25, 2003 (JP) 2003-083238

(51) **Int. Cl.****H01M 8/06** (2006.01)**H01M 8/18** (2006.01)(52) **U.S. Cl.** 429/20; 429/17; 429/26(58) **Field of Classification Search** None
See application file for complete search history.(56) **References Cited**

U.S. PATENT DOCUMENTS

5,798,187 A * 8/1998 Wilson et al. 429/26
6,127,054 A 10/2000 Ando et al.

FOREIGN PATENT DOCUMENTS

JP	58044671	3/1983
JP	61072995	4/1986
JP	2002-208430	7/2002

OTHER PUBLICATIONS

Ando Y. et al: "Proposal and fundamental analysis of thermally regenerative fuel cell utilizing solar heat", IECEC '97. Proceedings of the 32nd Intersociety Energy Conversion Engineering Conference. Energy Systems, Renewable Energy Resources, Environmental Impact and Policy Impacts on Energy. Honolulu, HI Jul. 27-Aug. 1, 1997, Intersociety Energy Convers, vol. 3 & 4, Jul. 27, 1997, pp. 1860-1864, XP010268861 ISBN: 0-7803-4515-0, point "thermally regenerative fuel cell".

* cited by examiner

Primary Examiner—Jonathan Crepeau(74) *Attorney, Agent, or Firm*—Lahive & Cockfield, LLP;
Anthony A. Laurentano, Esq.(57) **ABSTRACT**

A thermoelectric conversion apparatus having a high thermoelectric conversion efficiency comprises: a dehydrogenation reactor for generating hydrogen and acetone by an endothermic dehydrogenation reaction of isopropyl alcohol in the presence of a dehydrogenation catalyst and heat from a heat source, and a fuel cell which generates electricity by an electrochemical reaction of the hydrogen and the acetone produced by the dehydrogenation reactor. A module is constructed by integrating the dehydrogenation reactor and an electricity generating layer constituting the fuel cell into a stack.

3 Claims, 9 Drawing Sheets